551.578.1:551.509(794) NOTES, ABSTRACTS, AND REVIEWS

TWO SEASONAL RAINFALL FORECASTS FOR CALIFORNIA

Readers of the REVIEW will recall that in the November, 1925, issue we published the results of two investigations into the possibility of forecasting, on the basis of certain summer conditions, what the precipitation in the next following rainy season would be over California.

McEwen presented his computed and observed seasonal rainfalls for 7 groups of stations in central and southern California, and found that for each group a negative correlation was indicated between summer temperature of the surface waters of the Pacific Ocean off the California coast and the ensuing season's rainfall. The extent to which the computations of seasonal rainfalls have been borne out by the event, during the period 1916–17 to 1924–25, is most encouraging. It may be viewed in the following ways.

(1) There has been a rough numerical agreement between computed and observed values, over 75 per cent of the errors being of 2 inches or less.

(2) There has been agreement between the signs of computed and observed departures of precipitation from the nine-year normal, about 80 per cent of the time.

(3) In 56 computed versus observed trends of rainfall from one season to the next (7 groups of stations for 8 seasonal differences), there has been disagreement but eight times, indicating agreement in trend in 85 per cent of the cases.

McEwen's computed departures for the 1925–26 season (7 groups of stations) indicated rainfall in excess of normal by amounts ranging from 0.4 inch to 1.2 inch according to the group. Rainfall records for southern California to April 23 show that: The sign of the computed departure is already borne out by the event; the computed excess falls short of the actual excess; the actual trend since the 1924–25 season, while it is the reverse of the trend which results from considering the computed values for 1924–25 and 1925–26, agrees with the trend from the observed rainfall of the former season to the computed rainfall of the latter.

Blochman, from a comparison of certain pressure and rainfall conditions during summer and early autumn with the ensuing season's rainfall for central and southern California, arrived at several conclusions of which the following seem most pertinent to quote here:

(1) It is almost a certainty (better than a 90 per cent probability) that when South Pacific LOWS enter south of Cape Mendocino in either September or October, the ensuing season, especially for southern California, will be average to wet. This high percentage does not hold good for northern California, but it does for central California.

(2) Assuming 0.21 inch to be an "average" summer rainfall at San Diego, the tabulation shows that 19 seasons out of the 21 that had average or more than average summer rains preceded average to wet seasons in southern California. But * * * when we consider only the appreciable summer rains at San Diego due to LOWS that came in from the Pacific, *there are 19 seasons out of 20 that preceded average to wet seasons in southern California.*

In the first week of October, 1925, San Diego experienced a rainfall of some 3½ inches, from a LOW that appears to have developed close to or over the adjacent coast. The total excess of rainfall for the month was 3.2 inches. Discussing this event in the Berkeley Gazette for October 9, 1925, Blochman pointed out its probable bearing on the coming season's rainfall, and concluded that: "There is no reason why this season should be an exception to the rule, especially as it has the greatest early rainfall recorded."

In view of these advance estimates by both McEwen and Blochman of what the 1925–26 rainfall season would bring forth, the rainfall at five representative stations in southern and central California from July 1, 1925, to April 23, 1926, compared with the *normal seasonal total*, is of interest:

	San Diego	Los Angeles	Fresno	San Francisco	Sacramento
	Inches	*Inches*	*Inches*	*Inches*	*Inches*
To Apr. 23, 1926	15.56	17.36	9.28	20.45	15.61
Normal seasonal total to June 30	9.70	15.62	9.82	22.52	18.56

—*B. M. Varney.*

TORNADO REPORTED FROM NORTHWESTERN OREGON

It is very rarely that tornadoes occur in the Pacific Coast States. Mr. W. J. Kelley, of McMinnville, Oreg., has sent to the Weather Bureau a report of what appears to have been a small tornado that damaged his farm on February 19, 1926. The account, together with photographs accompanying it, indicates the occurrence of winds which were certainly of tornadic violence, which felled many trees; the same storm destroyed a large "dry house" about a mile southwest of Mr. Kelley's farm. It is stated there was no lightning, thunder, nor hail with the storm, though it rained heavily for a short time. A friend of Mr. Kelley told him that "there seemed to be four or five little whirlwinds in a bunch coming down from one big and very black cloud and whirling around with great speed."—*B. M. V.*

RELATIONS BETWEEN THE TEMPERATURES, PRESSURES, AND DENSITIES OF GASES

Under the above title the Bureau of Standards of the U. S. Department of Commerce has published its Circular No. 279, by Mr. S. F. Pickering, associate chemist of the bureau. The author's abstract follows:

The attempt has been made, in discussing the relations between the temperatures, pressures, volumes, and weights of gases, to derive the formulas in a simple manner with the minimum requirements of theoretical knowledge on the part of the reader. The experimental data involving high pressures are presented in such a form that problems of this nature can be easily solved by introducing factors taken directly from the curves. The significance of the equations of state of van der Waals, of Dieterici, and of Berthelot are discussed, and the manner in which these quotations may be used to predict compressibilities is explained in detail. Comparisons of the calculated values with the experimental data for various gases are shown by means of a series of curves. There is included a rather extensive bibliography of the literature pertaining to the subjects herein discussed, together with a number of tables of conversion factors and equivalents.

THE EDGE OF THE DOLDRUMS

C. E. P. Brooks in the Meteorological Magazine for March, 1926, presents results of a study of the relation between rainfall and wind direction and constancy of direction at Malden and Ocean Islands, both of them close to the Equator and both under the influence of the trade winds. The uniformity of their ocean environment would lead one to expect winds of whatever direction to be of not greatly differing constitution in respect to temperature and relative humidity, which is indeed the case of the surface winds. But out of 72 months of record (in *Reseau Mondial*), 32 months in which wind directions averaged more than 60° from North and in

which the constancy [1] of the wind was more than 70 per cent, included only one month with rainfall in excess of 100 millimeters; while of the remaining 40 months (having directions within 60° of north) all but one showed more than 100 millimeters.

At Malden Island, the months with north or northeast wind had nearly five times as much rainfall as those with east and southeast. At Ocean Island, the months with resultant winds between 65° and 120° had only about one fifth of the rain that months with winds from other directions had.

A very clear relation exists between constancy of wind direction and rainfall; the greater the constancy during a given month, the less the contemporaneous rainfall. Thus at Malden Island the correlation between the two is −0.73; at Ocean Island it is −0.72, which becomes −0.76 if a single month which had heavy rainfall with northeast wind (April, 1919) be excepted.

Tables are presented showing that the apparent dryness of winds from east and southeast is due largely, but by no means entirely, to their greater constancy. In other words, in this region of the equatorial Pacific, conflicting wind directions seem to be the greatest source of rain. The existence of these conflicting directions may be taken to indicate a zone of eddy motion in the atmosphere at the edge of the doldrums.—*B. M. V.*

551.515 (94)

AUSTRALIAN WINDSTORMS

A discussion on Australian hurricanes and related storms, with an appendix on hurricanes in the South Pacific, prepared by Mr. Stephen S. Visher of Indiana University and Mr. D. Hodge of the Bureau of Meteorology, Melbourne, has been issued under the direction of Mr. H. A. Hunt, Commonwealth meteorologist (Bull. No. 16, Bureau of Meteorology, Melbourne). The publication has been undertaken that all recorded data regarding the occurrence of hurricanes in Australia and the surrounding tropical waters might be available for the information of mariners and shipping interests generally. In Australia the Queensland coast is most often affected by hurricanes. In the 34 years 1890–1923 they averaged one or two a year, coupled annually with two or three storms of less severity. Four-fifths of the storms occur in the five months December to April, and two-thirds of the storms occur in January, February, and March. Most of the hurricanes which affect Queensland come from the east; many recurve near the coast and pass southward, frequently as far as Brisbane. Western Australia has, on the average, rather more than one hurricane a year. In the 52 years 1872–1923, 74 severe tropical cyclones were recorded; some years had as many as three, and one year, 1917, had five. Of the less severe types of storm, Western Australia has fewer than Queensland. The portion of Western Australia which is most frequently damaged by hurricanes lies far north of Perth. The hurricanes are most frequent in the hotter months. The Northern Territory has fewer cyclones than Queensland or Western Australia. Attempts have been made to issue long-previous predictions of hurricanes but no satisfactory result has been attained. Maps are given showing the hurricane season in different parts of Australia and the movements of the hurricanes at different seasons of the year. *Nature*, (London), *February 20, 1926.*

[1] "The resultant direction and 'constancy' are computed as follows: Each observation of direction is regarded as a unit vector and the resultant direction is obtained by compounding the unit vectors. The 'constancy' is represented by 100 times the ratio of the vector sum of the unit vectors to the number of observations (calms included). Direction is specified by the azimuth of the point from which the wind is blowing, and is measured in degrees from north through east."

METEOROLOGICAL SUMMARY FOR SOUTHERN SOUTH AMERICA, FEBRUARY, 1926

By Señor J. B. NAVARRETE
[El Salto Observatory, Santiago, Chile]

February was characterized by a rather stable atmospheric régime, continuing the hot period in the central zone of Chile. During the entire first decade the anticyclonic center dominated the south, with general fine weather, high temperatures and prevailingly southerly winds, which were rather heavy between the coasts of Chiloe and Arauco Provinces.

On the 12th, it rained in Chiloe, Haufo, and Raper, and on the 13th light rains extended as far at Valdivia, the most important fall being 8 millimeters at Cabo Raper.

On the 18th and 19th pressure rose in the south; on the 20th the center of the high pressure was located off Valdivia, and it rained from this point south. On the 22d the change of weather affected the central zone of Chile, with light rains and a smart fall of temperature.

From the 23d to 25th, pressure rose in the south, forming a high pressure center in the interior of the continent, with the highest pressure at Neuquen in the Argentine.

During the later days of the month, 26, 27 and 28, an important depression overlay the southern part of the continent, causing rains between Malleco and Magallanes; maximum precipitation was 20 millimeters at Cabo Raper.

At Valdivia, one of the rainiest regions of Chile, only 59.5 millimeters fell during February.—*Translation by B. M. V.*

551.506 (81)

METEOROLOGICAL SUMMARY FOR BRAZIL, FEBRUARY, 1926

By J. de SAMPAIO FERRAZ
[The Meteorological Office, Rio de Janeiro]

Circulation as expressed by the number of HIGHS and LOWS was slightly weaker in the month of February. Four anticyclones visited the country and although their tracks continued abnormal as of late, most of them affected northern Argentine and Matto Grosso, sending cold air to the far north, causing very likely, as we think, larger rainfall in those regions. The continental depression and the migratory LOWS of the extreme south were less active.

Rainfall was generally abundant in the north and center and below normal in the south with the exception Rio de Janeiro State and scattered points. Big floods occurred in the San Francisco River. Rio Grande do Sul continued with droughty conditions, which as explained, were caused by smaller activity of low-pressure areas and tracks of the anticyclones.

The weather in Rio de Janeiro was slightly unsettled, but with little rain. Temperature continued abnormally low, closing the summer season with an exceptionally cool month. Southerly winds were prevalent, but generally moderate.

Crops generally did well except in Rio Grande do Sul, where they suffered on account of lack of precipitation.

DR. DE SAMPAIO FERRAZ

We regret to learn of the temporary retirement of Doctor Ferraz from the directorship of the Brazilian Meteorological Service due to continued ill-health and the necessity of refraining from the onerous administrative duties of that position for several months or longer.—*A. J. H.*